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SOIL conservation

Outdoor
learning
at school

Soil Conservation Service,
U.S. Department of Agriculture

XUM

SOIL conservation

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The world as a book...

From tiny school-lot corners to whole forests—educators are looking to nearby outdoor areas for "classrooms without walls." Aware that environmental understanding is needed more each day, they are moving to put "the outdoors" in every school subject and to put every student in the outdoors.

Educators and conservationists share the belief that tomorrow's tough resource decisions will require adults whose knowledge matches their concern.

This month's articles are a cross section of progress in faculties and facilities for environmental education.

In West Virginia (p. 3) and Iowa (p. 8), summer workshops show teachers about the outdoors and how to use it as a teaching tool.

In California (p. 9), a 1,200-square foot environmental study center has a model conservation farm and produces thousands of study aids each year. In Washington, D.C. (p. 12), an area not much larger has been transformed into an outdoor classroom by students and teachers working with SCS.

In Michigan (p. 10), 17 school forests were planted by students in the 1930's, and now students help maintain them.

Other action . . .

A theme shouldn't and doesn't make a whole issue. Check through the rest of this month's offering for a sample of the varied work of SCS and others—from wildlife to waterspreading, from ponds to pangolagrass.

COVER: As more and more schools gear up for learning in the outdoors, more students are finding patterns and purpose in nature —such as these gramagrass spikelets in New Mexico.

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School districts share cost of conservation learning outdoors

By James S. Bennett

Now state conservationist, SCS, Morgantown, W. Va.
Formerly assistant state conservationist, Columbus, Ohio.

Three Ohio school districts are sharing the costs and challenges of conservation education for 15,000 students and 700 teachers through the Tri-District Outdoor Education Project.

The program does much more than teach conservation to science and biology students. It is aimed at developing an understanding of the natural environment and of conservation principles—for all the students in those districts.

The result is a comprehensive program for all students in participating schools in the Worthington, Westerville, and Grandview school districts.

A converted shelter house in the Worthington district is headquarters of the project staff. Two outdoor teachers and a project secretary assist Eugene Knight, project coordinator.

"We help science, history, and math teachers, and others who want to teach students to appreciate and enjoy a clean, wholesome environment," Knight explained. "We want them to know more about birds and their habitats and perhaps most of all to learn the things that we must do to maintain a quality environment."

Students in primary grades are involved in activities that emphasize awareness and appreciation. Upper elementary students take part in studies of specific environmental conditions and problems.

All fourth graders participate in outdoor study units designed to introduce them to the outdoors as a laboratory for learning. The staff of the Tri-District School Project sends background material to all fourth grade teachers for preparatory study. Each class has at least one half-day session in the lab with a Tri-District teacher.

From fifth to ninth grade, teachers use the outdoor approach in teaching biology, sociology, history, geology, and other subjects.

Teachers may take classes to one of several outdoor study sites. Most often visited is the 35-acre Worthington Outdoor Laboratory at the Tri-District headquarters.

One of the most intriguing areas is a pond at Brookside Elementary School. Here students learn about fish pond management, aquatic life, and wildlife plantings. Soil Conservation Service specialists provided information and engineering help through the Franklin Soil and Water Conservation District to build the pond and develop the surrounding area.

An executive committee made up of superintendents from the three

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Learning about the environment includes collecting litter samples (above), water from a polluted stream (above right), and weather data (right).

schools meets each month. With Knight, they set up program objectives.

"Outdoor Education" is a news sheet published every 2 months. Guest editors offer details of projects that may prove interesting. A recent issue contained titles such as "Watch for Animals to Come Out of Hibernation," "It's Sugaring Time," "Feed the Birds," and "A First and Second Look at Frost."

Outdoor education workshops are a feature of the Tri-District effort. Federal assistance under the Elementary Secondary Education Act eases the financial burden for teachers to attend.

The citizens of Westerville, Worthington, and Grandview are enthusiastic about their joint effort in outdoor education. Together they offer many advantages that one school alone could not provide. ♦

Outdoor labs built for all county's schools

The 1,600 children in West Virginia's Ritchie County found outdoor classrooms beckoning last fall when they returned to school.

In the vacation months all public school grounds in the county underwent a reshaping for conservation learning.

Paul Siegrist, assistant superintendent of schools, said the idea came to him while he was principal at Cairo School. Because of daily injuries to children on the graveled playground, Siegrist asked the Parent-Teachers Association to take the lead in beautifying the grounds.

When Siegrist told District Conservationist Shelby Van Scoy of the Soil Conservation Service about his plan, Van Scoy explained services available from state and federal agencies.

The plan, with many agencies and groups helping, took shape in early 1969. SCS Field Biologist William Melven and Agronomist Frank Glover, both of Morgantown, helped to plan trails, study areas, and remedies for school-site problems. Clifford Collier, landscape architect from West Virginia University, drew beautification plans.

The PTA took on the job of maintaining the outdoor laboratories.

Since Ritchie County is one of five counties in the Little Kanawha Resource Conservation and Development Project, a local program guided by SCS, RC&D funds were available to treat critical areas on the school sites.

The outdoor laboratories range from 1.6 acres at the Smithfield School to more than 400 acres at Cairo. And at Cairo there's no longer the lineup for first aid. There's a new, safe playground. The old graveled playground is now a beauty spot. ♦

Boise College repeats environmental workshop

Idaho teachers again have an opportunity to study the environment and learn how to take advantage of the out-of-doors as a teaching tool in the third annual Boise State College Workshop on environmental education.

The week-long workshop is sponsored by the college in cooperation with the Idaho Advisory Committee on Environmental Education. A picturesque 4-H camp in the pines along the shores of Lake Cascade is the setting.

Participating teachers may earn either one or two college credits in the workshop. A second credit requires an additional paper and lesson plan done around a project chosen by the teacher.

The workshop is under the leadership of Dr. Donald J. Obee, chairman of the Division of Science and Health at the college. Hal Mickelson, conservation educator for the Forest Service's Intermountain Region in Ogden, Utah, serves as interagency coordinator. Technical studies are supervised by Soil Conservation Service, Forest Service, Agricultural Research Service, and Idaho Fish and Game Department personnel.

Subject matter emphasizes elementary education needs and the ways in which environmental concepts can be presented to children by integrating the ideas into classroom lessons and through the use of the out-of-doors.

After an introductory discussion of environmental concepts and current thinking on environmental education, the teachers spend most of the week in outdoor laboratory sessions. They form small groups and work on such projects as soil, forestry, wildlife, weather, watersheds, aquatic biology, and soil-water-plant interactions.

A field trip to the top of Snow Bank Mountain takes the teachers through successive life zones, from the valley floor to subalpine conditions. At the mountain's top the teachers measure snow depth and check water content in a large drift that remains through August. They observe logging operations and timber restoration on national and state forest lands.

Teachers check snow depth and water content on Snow Bank Mountain.

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An SCS soil scientist shows how to find out what a soil is like.

Another field trip leads the teachers to the farm of Tom Fleming, a cooperator with the Valley Soil Conservation District. They spend a half day studying over the Fleming conservation farm plan and hearing the farmer explain his use of conservation-management practices on pasture and hay land. From his experience as a county commissioner, the farmer is able to relate some of the problems in resource planning encountered in a rural county. Other stops on the trip include a fish hatchery, a sawmill, and a state park. Environmental principles are discussed at each stop.

The 1970 workshop differs only slightly from the other two. Instead of partial funding through the U.S. Office of Education, as was the case in 1968 and 1969, the workshop has become an integral part of Boise State College's summer school. The school's administration regarded the workshop as too worthwhile to lose when federal funding was discontinued.

Teacher reactions at the end of the 7-day experience have been overwhelmingly enthusiastic. One teacher said, "For the first time I feel I can take my students into the out-of-doors and be able to show them how to explore and learn for themselves."

Encouraging is the number of followup requests from teachers after they return to their classrooms. In nearly every case they have set up their own environmental education program—often involving the entire school system.

A side benefit, growing out of association with the interagency committee during the workshop, is that the teachers attending know where to get help in obtaining materials and services. As a result, local interagency committees are being formed throughout Idaho to give whole school systems the kind of help the teachers themselves received at the workshop.—R. NEIL SAMPSON, *information specialist, SCS, Boise, Idaho.* ♦

Classroom

In effect it's an outdoor classroom on wheels.

It's an exhibit-size model school site which has been rolling from location to location in Northeastern States for more than a year.

It started as an exhibit at the Philadelphia (Pa.) Flower Show in 1969 with six mallard ducklings on a tiny pond serving as a major attraction. Its next viewing was at the Virginia State Fair in Richmond. Then in March it opened at the Providence (R.I.) Flower Show.

The tally of those who have seen

on wheels

the exhibit now tops 200,000, its Soil Conservation Service designers estimate. The viewers included scores of educators interested in developing outdoor classrooms for children to learn about natural resources and improving the environment.

The exhibit is modeled after an outdoor classroom at Freehold (N.J.) Elementary School. For the showings, conservation shrubs were prepared in greenhouses to be seen at seasonal peak.—GORDON L. LECKIE, *Field Information Unit, SCS, Upper Darby, Pa.* ♦

Conservation district supervisors and SCS work together (above) constructing the prize-winning exhibit (below). Mallard ducklings (below left) were a main attraction.

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Voices of the "Turtles" tell conservation story

By Susan Stanfield
First grade teacher, Roosevelt School, Davenport, Iowa

We Iowa teachers went to Springbrook Conservation Camp near Guthrie Center, Iowa, to learn about land, water, trees, and wildlife.

We ended up becoming "Turtles." A turtle, you see, is the mascot of the camp, and the students affectionately call the place Turtle Camp.

The 3-week program with field trips, conducted by Soil Conservation Service specialists and others, stressed a different phase of conservation each week: Forestry, soil and water, and fish and wildlife management.

The intent was that we Turtles would share our conservation knowledge and experiences with children and adults across the state, helping to bring about a broader understanding of conservation techniques and principles.

A trip to Sheeder Prairie, a virgin Iowa prairie, brought new understanding of soil and plant relationships.

On the trip to Goose Lake, we entered the marsh in an airboat and were dumped out to explore the wonders. We gained a new appreciation as we waded into 10-inch-deep muck and struggled with the chest-high weeds. We found none of the foot-long leeches we had heard about. We enjoyed the excursion in spite of early fears.

The visit to Holst State Forest and the Wildlife Research and Exhibits Station at Ledges State Park tied the program together.

The real benefits from Turtle Camp came after we got home. In applying in the classroom what I learned at camp, I use the same techniques—seeing and touching, exposing and doing. It works with first graders, too.

Seasons serve as guidelines for selecting subject matter. In quickening the children's natural interest in nature, the trick is to capitalize on curiosity, lead their questions, then carry them forward with a challenge.

For example, when we decided to look for signs of spring, we started with a general discussion, and then my spring nature detectives went into action. Judy found a book in the library about birds. Martin brought in a sparrow's nest. With these came questions — "How come?" "Why . . .?"

Here was my opportunity. A bulletin board showing local birds and their homes, charts showing nests and choices of habitat, SCS booklets showing how landowners provide food and cover, all were explored for answers.

To be helpful to our bird friends we decided to bring in nesting materials and build a nest. Simple? Yes. Sophisticated? Definitely. After several attempts, we decided Mother Robin could do the job better, but we had learned to appreciate her life, habitat, and customs.

When my young conservationists invited a professional conservationist to class, he was bombarded with questons. "How do birds build their nests?" "What can we plant to help them find food and nesting materials and why are nests built at different heights?"

"What does the father bird do?" demanded Randy when the questions seemed to dwell on the female too much. Another boy, after examining a wooden birdhouse, inquired, "How do they make those wooden houses?"

Questions and comments from the class served as the best guides for planning...Moving from birds to plants to land, the children were alert, aware, and interested. They aren't afraid to be enthusiastic and inquisitive.

Enthusiasm is contagious, and it bounces from teacher to child and back to the teacher again. Teacher is the source but steers the project with as light a touch as possible. Most children will challenge themselves.

The teacher's reward? More questions! And a greater depth of understanding by the students. None is too trite or delicate for response for they provide learning opportunities.

When questions lag, it is time for teacher to prod and prompt again, this time with a new angle or a new season. These queries ultimately touch water quality, land management, soils, trees, grass—and the whole concept of conservation enters the young mind.

In the thick of the questions we Turtles begin to apply our own camp experiences in relating the subjects to our curious young conservationists. Here we begin to spread the word about conservation and at more than a turtle's pace. ♦

Mini-center opens conservation doors

An environmental study area, given the name "Conservation in Miniature," is a practical, challenging, and economical conservation study project in Los Angeles, Calif.

It was developed by Ralph Turner, elementary science specialist in charge of the Monlux Science and Conservation Center for the Los Angeles Unified School Districts.

Conservation in Miniature is only a part of an innovative conservation program developed 7 years ago within the limitations of budget and personnel common to many urban school systems.

Turner contends that any school district can duplicate the Monlux program at little expense. Conservation in Miniature cost only $150 to $200 in basic materials. It can be adapted to fit local conservation patterns of any part of the country. Volunteer personnel can be recruited and trained from within the community.

The center's outdoor environmental area totals about 1,200 square feet. One part contains "working" and "living" examples of scientific conservation on the farm. The visiting school children develop an awareness of the value of farm practices such as contour farming, terracing, waterways, windbreaks, and conservation grazing. A model of the Los Angeles basin flood-prevention project adds to their understanding of water conservation and management.

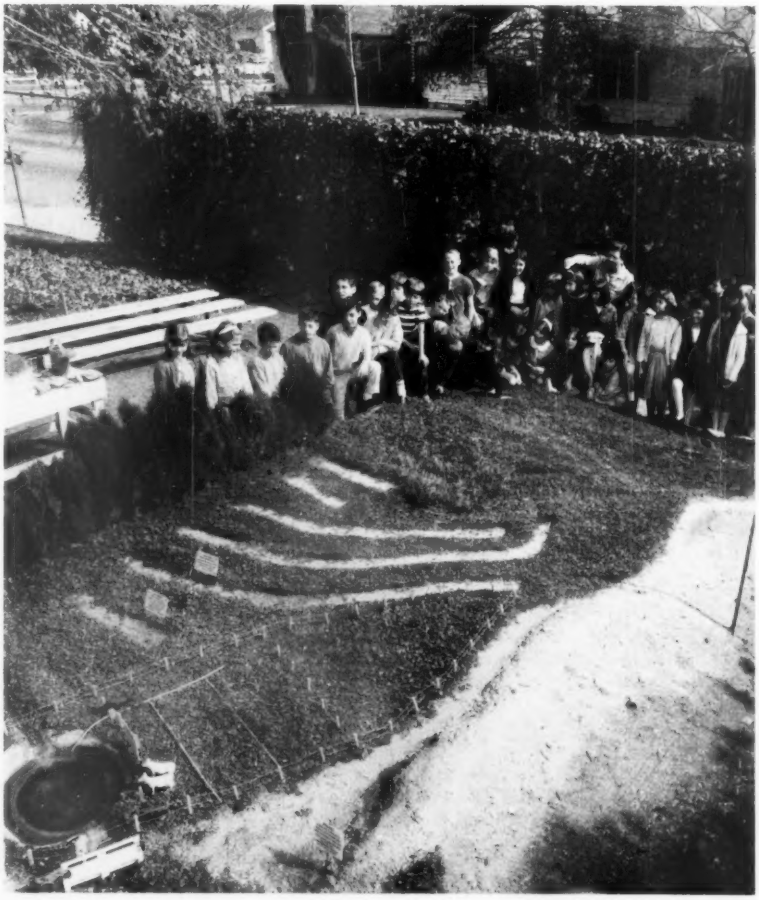
The center's teacher resource building contains environmental resource materials and publications dealing with soil, water, plants, wildlife, and minerals. Thousands of instructional aids are produced in packet form each year for teachers to help relate conservation to the state textbooks. Two thousand earth-science kits of investigational materials for children are assembled and distributed each year.

Through the years Monlux has had only one laboratory-type environmental classroom staffed by a qualified teacher. Now there is a second classroom staffed by trained volunteers. The new facility is equipped to involve children on an investigational or experiencing level.

Directors of the San Fernando Valley Soil Conservation District have made the Monlux Center part of their program in conservation education by preparing a giant-sized, full-color postcard which pictures the Conservation in Miniature area. It is distributed, with additional information about the center, to conservation districts in California and other states.

The San Fernando District, which was formed in 1944, now includes densely urbanized segments of Los Angeles. This means that the Monlux Center is a useful conservation program for the city-dwelling childen of the area's school districts.—EURSELL S. CORDELL, *district conservationist, SCS, Lancaster, Calif.*♦

Model farm shows many practices that prevent erosion and improve farming.



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Trees that teach

By William M. Allred
District conservationist, SCS
Grand Haven, Mich.

Pines planted 20 to 25 years ago on school-forest land are ready to prune and thin.

School forests in western Ottawa County, Mich., have for more than 30 years proved their value as renewable, instructional resources.

They are part of an outdoor education program initiated by the West Ottawa Soil Conservation District soon after its formation in 1938, when the County Board of Supervisors leased 2,000 acres of land to the district for long-term stabilization work.

The original forest in western Ottawa County had been cut or burned over between 1840 and 1900 —some of it to rebuild Chicago after that city's great fire. Later, farming operations depleted organic matter in the sandy soils and dune areas. Families moved away when the soil began to blow.

Many of the teachers and school children who stayed in the area helped the district cope with drifting sand by planting new trees. The district leased 17 tracts within its 2,000 acres of county land to schools for 50 years. Students and teachers then planted mixed pine seedlings furnished by the district's nursery in each school's forest of the future.

Clarence Reenders, chairman of the district board of directors (who has served on the board continuously since 1938), recalls:

"I drove many miles with my old Ford hauling kids and trees. We furnished the ice cream and they planted trees."

Most of the small schools have been annexed by larger systems, but they are still involved in the project.

"Each year we expand our outdoor education program," Reenders said. "At the present we are working with 44 schools in Ottawa County. Each signs up as a coopera-

tor with the district and is thereby entitled to technical assistance from Soil Conservation Service."

Soil maps and planning aids are ordered for each school site. Problems and possible projects are discussed after the school administrator or his representative has walked over the site with conservationists. Each school is directly involved in the preparation of a plan tailored to its conservation and educational needs.

"As we work with schools, we enjoy the enthusiasm of the administrators and teachers involved. The wide range of activities possible in an outdoor classroom seems almost unlimited," Reenders said.

Trees in most of the school forests are now large enough for pruning and thinning. Several summers ago, Grand Haven schools sold 5 cords of pulpwood per acre after they had worked on their forests. The income paid for most of the timber-stand improvement.

The Ventura School for handicapped children makes good use of the Beechwood School forest, a 35-acre pine plantation. Older boys prune crop trees selected by the Michigan Department of Natural Resources forester. Pruning limbs off trees up to 17 feet makes it possible to eventually harvest sawlogs that can be cut into lumber free of loose knots.

"It gives the boys something to do as well as a feeling of accomplishment," says Harold Knoll, who is in charge of the program.

Each year Christmas trees are harvested and sold from the Robinson School forest operated by the Grand Haven schools. The project is carried out by the senior high school marketing class. Students cut, bundle, haul the trees to Grand Haven, and set up sales lots. They determine prices and make sales. Proceeds are used by the school to finance other conservation activities.

"We try to relate conservation of natural resources to as many subjects as we can," Jack Barendse, Peach Plains School principal, said. "The school forest is an excellent place to teach children about their environment. It is valuable in teaching esthetic appreciation as well as responsibility for maintaining natural areas for erosion control and wildlife habitat."

Last year Grand Haven, West Ottawa, Hudsonville, and Coopersville schools planted 100 wildlife packets of 100 plants each on their school grounds under district supervision. These will provide wildlife food and cover and add to the value of the outdoor classrooms, too.

Indoor support for these outdoor programs can be found in the visual aids library of the Ottawa Area Intermediate Schools. Urban and rural schools throughout Ottawa County use the library's wealth of material on conservation and other subjects.

Since 1942, students from urban and rural schools have toured the county to see conservation practices.

One year as many as 1,200 students took part. The tour is sponsored by the district in cooperation with the Ottawa Area Intermediate School District, the Ottawa County Extension Service, and the Soil Conservation Service.

With the support of these agencies and continuing interest on the part of the schools, the district's school forest program will probably continue to grow as sure and strong as those first trees set more than a generation ago. ♦

Signs like this mark school-forest sites in the West Ottawa District.

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Green School — environment of another kind

Teachers and students joined in creating their outdoor classroom around Green School. On the wooded terrace and bare, sloping land students entered eagerly into the work of planting grass and shrubs. At left, teachers and students review conservation plan with Ernest Moody of SCS.

To a child in a city's center, environment is pavement, traffic lights, and the smell of auto exhaust.

At Mildred Green Elementary School in Washington, D.C., the students now know environment of another kind, where they learn about soil and water, and where they walk a nature learning trail to touch, smell, and study flowers, leaves, and trees.

The Green School outdoor classroom project has the enthusiastic cooperation of Principal Vandy Jamison and a group of dedicated teachers, with the firm support of the District School Board.

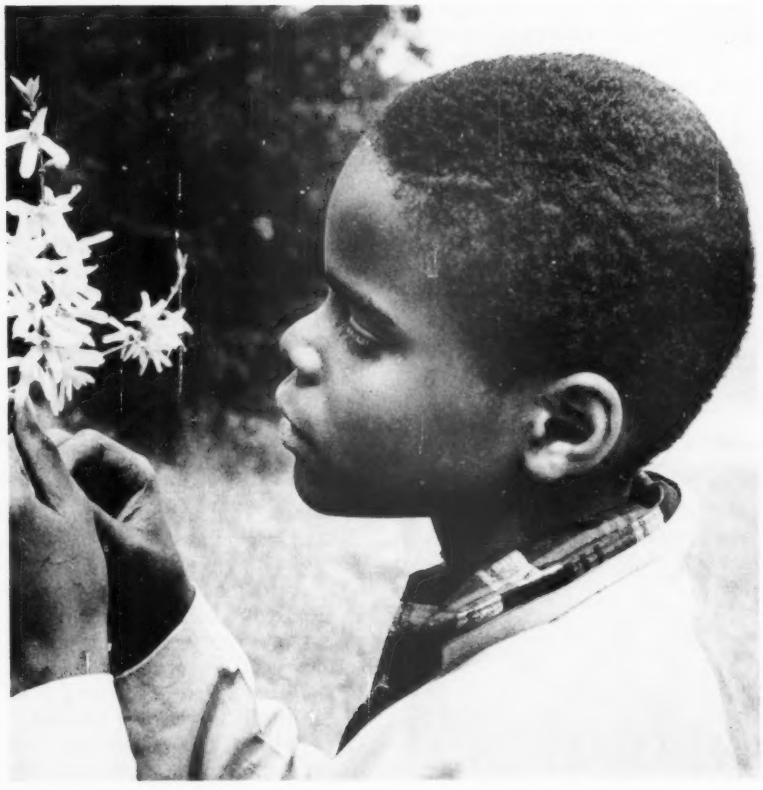
When the board's science supervisor decided on Green School as the site for a pilot project for a center-city school site development 2 years ago, the Soil Conservation Service in nearby Maryland furnished a conservation plan for the grounds, with technical help and the services of District Conservationist Ernest Moody to work with the teachers and students in using the outdoor classroom.

Green School happened to have more land than most center-city schools, but it also had more problems with erosion and surface water runoff.

Students planted grass on eroding slopes behind the school. They planted pine seedlings, autumn olive for wildlife food and habitat, and forsythia for beauty. Thick-growing crownvetch stabilized the most seriously eroding areas.

The School Board built a retaining wall to hold a steep bank in check. Next spring the students will plant Memorial Rose along the wall's top.

With the conservation plan for the site as a guide, the whole area is used as a teaching laboratory where city children are learning about a kind of environment they hadn't known before. ♦



Even a decaying stump (above) holds an environmental lesson. A student (left) caresses the petals of a shrub he helped plant.

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Waterspreading — a way to soften hard times

Conservationists call it waterspreading. The idea is based on a physical fact: If you don't use the water when it is there, you probably won't get a second chance.

In South Dakota, where water is regarded with special respect, the farmers and ranchers in two conservation districts have been developing waterspreading systems to make use of water that, the way they look at it, might otherwise be wasted.

Waterspreading, they point out, doubles hay yields. The increased hay stabilizes farming operations by providing feed reserves for periods of dry weather.

More than 7,000 acres now benefit from waterspreading in the Tri-County and Ziebach County conservation districts. Soil Conservation Service specialists have worked with the operators, designing the systems to fit the land and suggesting land treatment as needed.

The system on the Two Rivers Ranch collects water from a 34-square-mile drainage area. The water is delivered to 280 acres of western wheatgrass pasture by a network of dikes and ditches.

The system designed for Guy Schickedanz in the Ziebach County District includes a dam with a 2-foot headgate that automatically puts a foot of water on 41 acres of grass. Schickedanz' $3,200 cost for the system was shared through the Great Plains Conservation Program.

Lawrence Woodward, near Dupree, uses a combination system to water 500 acres of grass and alfalfa. When water is available in Bear Creek, Woodward pumps the water to cover 140 acres of alfalfa. Two dams in another section of the ranch hold water for Woodward's western wheatgrass. The cattle harvest the hay in late fall.

On the Cecil Vig place, in Meade County, a dam pierced by a corrugated metal pipe waters 30 acres of grass to depths up to 2 feet. On another section a pumping system puts water on alfalfa. Levees spaced to hold water up to 1 foot on the land were designed by SCS engineers.

South Dakota laws require a landowner to have rights to any water he draws from a stream with more than a 160-acre watershed. Rights are usually granted after proper application, advertising, a hearing with no objection voiced, and the payment of $8.00 in fees.—VERDETTE R. THOMAS, *district conservationist, SCS, Faith, S. Dak.* ♦

Water from a 34-square-mile drainage area makes a hay crop more certain on this 280-acre field of western wheatgrass.

Best of all worlds

Pat Hunt and Bonnie Proctor, television teachers at KCTS-ETV in Seattle, Wash., discovered they needed help when they started work on a conservation education series on man and his environment.

They had excellent help with the teaching concepts of the series. But they found they lacked information on technical aspects of conservation, ecology, and environment.

When they noted that photographs that caught their eye in conservation books were taken by Soil Conservation Service personnel, they turned to the Field Information Unit of SCS for help.

The result is a series of 32 programs entitled "The Best of All Worlds."

Pat Hunter (left) and Bonnie Proctor of KCTS join Duane Bosworth of SCS in one of 32 educational programs.

The series stresses the importance of intelligent use and management of natural resources for a healthful, productive, and beautiful environment. It is designed to give 450,000 Washington intermediate school children a broad background in resource relationships and conservation principles. ♦

Letters say thanks for tree planting

In Albuquerque, N. Mex., where he is soil conservationist for the Soil Conservation Service, Al Martin has acquired a widening circle of young friends.

He became aware of his new popularity after arranging several planting projects for local schools. He used native woody plants and trees from the Las Lunas Plant Materials Center of SCS.

One primary class expressed its appreciation in letters—40 of them—with envelopes decorated with sketches of trees, shrubs, and flowers, all in color.

Karen Celum wrote: "Dear Mr. Martin. Thank you for our trees. We are going to have an outdoor classroom. Our school is going to have a beautiful school now."

And Raymond Saavedra's note said: "Dear Sir: I would like to tell you thanks for the trees. It was fun while it lasted."

Ruthie Pacheco's note was somewhat more lavishly illustrated than others. "Dear Mr. Martin," she wrote. "I really appreciate those most wonderful flowers and trees you brought for us. We really enjoyed planting those trees. And also thanks for helping us. . . . Now that you brought us those plants our school will be the most beautiful school in the world." ♦

Outdoor lab is gift by city to Idaho school

Elementary school students in Peck, Idaho, study conservation practices and principles in their own outdoor laboratory on city park property near the school.

The pupils planted 12 species of grasses in staked-out plots near their arboretum area. They will observe growth and development.

Wildlife studies will be made in the wooded portions of the park. An abandoned motorcycle trail up the hillside gives them an opportunity to study the effects of erosion.

The city of Peck donated the park area for the outdoor laboratory. In return, the students are cleaning up the park and planning a variety of plantings of trees and flowers to improve the park land. Teachers, parents, and community residents have helped.

Technical assistance was furnished by the Department of Public Lands, Idaho Fish and Game Department, Federal Extension Service, Agricultural Stabilization and Conservation Service, and the Soil Conservation Service. Service to the outdoor laboratory were coordinated through the Rural Development Council. The specialists also prepared a teaching guide to give the students a broad understanding of environmental relationships in the conservation studies. ♦

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Conservation in action...

Planting a windbreak is a time for learning

California

Instructors, students, and the Soil Conservation Service staff worked jointly with a California rancher to plan for and plant trees and shrubs for field windbreaks and wildlife.

Don Dow had wanted for 3 years to make a windbreak-wildlife planting on his Honey Lake Valley ranch near Susanville. He never found the time for it, because his operations included 700 acres of irrigated land in grain, hay, and pasture; 200 head of beef cattle; and a licensed duck club and pheasant shooting preserve.

Then in 1969, instructors and students of the classes in forestry and agriculture at Lassen Junior College and SCS employees worked with Dow to plan a tree-shrub planting for the following year.

Plants were ordered from the California Division of Forestry Nursery. Dow prepared a seedbed, installed ditches for irrigation, and fenced the area to be planted to exclude livestock.

The students planted more than a mile of three-row windbreaks of Jeffry pine, Russian Olive, and Caragana (Siberian pea-shrub).

According to one forestry instructor, John Hamilton, "This project provided some firsthand experience for the class in planting seedlings and helped acquaint them with trees and shrubs suited for a wildlife-windbreak planting." — JESSE LANGDON, *district conservationist, SCS, Susanville, Calif.*

North Dakota

A good life for both—wildlife and the farmer

Victor Muggli, who farms 1,630 acres near Glen Ullin, N. Dak., is convinced that wildlife and man can subsist in harmony on the same land. His farm is proof.

He has set aside parts of his acreage for wildlife use. He seeded 420 acres under the Cropland Adjustment Program of the Agricultural Stabilization and Conservation Service to grass for wildlife. Creek bottoms, odd corners, and damsites, protected by more than 5 miles of fence, add up to about 430 acres managed primarily for wildlife food and cover. Twelve of the 14 dams Muggli built are for wildlife. Several impoundments are stocked with fish.

A large tree planting is underway to protect wildlife and the Muggli farmstead. And Muggli plants clumps of trees for wildlife in scattered areas.

Wind stripcropping, spring development, crop residue management, proper use of range, and cross fencing are other marks of the conservation farmer on Muggli's place.

The wildlife improvements already have helped to increase numbers of deer in the area, and the dams now are producing duck broods each year as well as providing excellent fishing.—HERBERT T. MITTELSTEDT, *district conservationist, SCS, Mandan, N. Dak.*

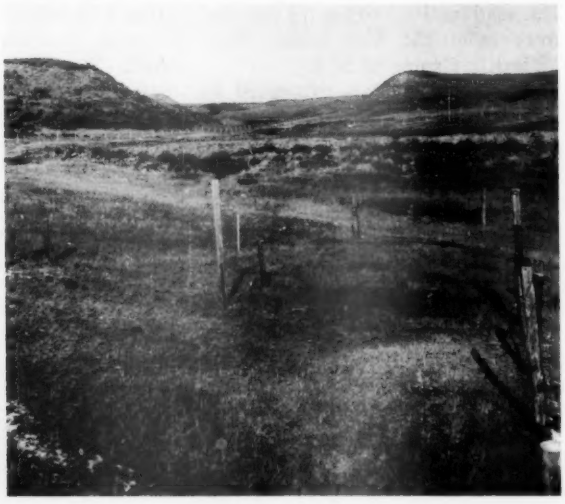
Kansas

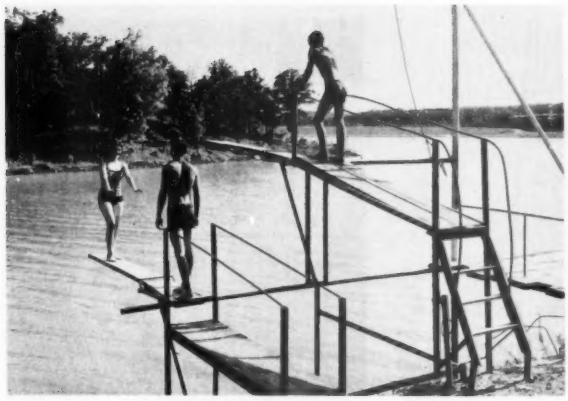
Floodwater dam offers income opportunity

Allen Kirkpatrick of Havana, Kans., saw an opportunity for a business to supplement his farming when a flood-prevention dam was built near his place as part of the Twin Caney Watershed Project. Soil Conservation Service conservationists had decided the dam was feasi-

Planting a mile of windbreaks.

Fencing protects woody vegetation from livestock.





Allen Kirkpatrick's Timber Hill Lake.

Near Andover is beautiful Hussey's Pond.

ble for the protection of cropland and other rural property.

The city of Caney, 8 miles southeast, needed a supplementary supply of water and paid for 600 acre-feet of storage in addition to the normal capacity of 257 acre-feet of water.

Twenty-nine of the 91 acres of the reservoir are on Kirkpatrick's 624-acre farm.

Through the Chautauqua County Soil Conservation District, Kirkpatrick received technical help from SCS in planning a 56-acre land and water-recreation area. He received a Farmers Home Administration loan for the project.

An attractive sign on Highway US-166 calls attention to the recreation area and indicates memberships are available for fishing, boating, and picnicking.

A well-built access road takes visitors through the woods. Along the lakefront, Kirkpatrick built trailer camping sites and a picnic area. A boat ramp and a diving platform have also been built. The lake is stocked with channel catfish and bass.—GRANVILLE DAVIDSON, *district conservationist, SCS, Sedan, Kans.*

Massachusetts

New England town acts to keep rural charm

Andover, Mass., is like most other towns. It has a choice—improve for man's use, or do nothing and decay.

State and federal natural resource agencies operating in Massachusetts have developed a way to help Andover with its conservation problems. Andover has taken full advantage of these services. The town shared with the Soil Conservation Service the cost of a soil survey with urban interpretations. Then the town's Resource Commission invited the Natural Resources Technical Team to help inventory the town's natural resources.

The team consists of representatives of the Massachusetts Department of Natural Resources (including the Division of Forests and Parks and the Division of Fisheries and Game), the Extension Service, and SCS.

The technical team prepared a report evaluating natural resources and potential for development, and the SCS district conservationist presented it to the citizens. The report showed Andover with a marked potential for recreation and conservation development area. Ample open space and woodland areas still are available, although housing development and industrial uses are in contention for land.

One of the significant natural areas is Hussey's Pond near Shawsheen Square in Andover's commercial center. Other opportunities for development center around a pond near the high school, recreational facilities at another pond, and a park extending to North Andover's town line.

The town has approved a bond issue for a quarter of a million dollars to start its environmental program. The Hussey Pond area has been purchased to assure the maintenance of this tranquil spot. Progress has been made toward acquiring land along the Shawsheen River with a recreational complex in the plans. Conservancy zoning based on soil survey information is in the making, and other actions are on the drawing boards.

Andover will remain a pleasant place in which to live.—WILLIAM H. COATES, *assistant state conservationist, SCS, Amherst, Mass., and* ROBERT N. MOREHOUSE, *district conservationist, SCS, Acton, Mass.*

Florida districts broaden programs

Florida recently became the 23d state in which all local conservation district programs have been updated to cover broader environmental improvements.

All district programs also have been updated in Arkansas, Colorado, Connecticut, Delaware, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, New York, North Dakota, Ohio, Rhode Island, South Carolina, Tennessee, Vermont, Washington, West Virginia, Wisconsin and in Puerto Rico. ♦

XUM

Fish pond study reveals correct management key

By Ivan L. Lines, Jr., and Verne E. Davison (retired)
Biologists, SCS, Red Bluff, Calif., and formerly in Portland, Oreg.

Fish pond owners in Shasta, Tehama, and Glenn counties in the Upper Sacramento Valley of California have joined in a Soil Conservation Service field trial to learn the cost and relative efficiency of warm-water fish pond fertilization.

Few ponds in California have been fertilized for best results. Most develop troublesome growths of submerged waterweeds that interfere with fishing. The weeds contribute little, if anything, to the quantity of fish produced.

One of the pond owners taking part in the trial is Mel Davis, a cooperator with the Western Shasta Soil and Water Conservation District. In April 1969, Davis' pond had been properly reshaped and was essentially weedless. But, by May 21 that year, weed growth began to appear again.

Davis began fertilizing the pond May 26. He placed the fertilizer on a 3- by 4-foot wooden platform submerged 8 inches. Within 72 hours, water currents and wind had distributed the fertilizer throughout the pond. This caused the growth of millions of microscopic-size algae or phytoplankton.

The dense growth of algae soon shaded the pond bottom and prevented germination and further growth of the aquatic weeds. The level of fertility was correct when there was enough phytoplankton in the water to obscure a white object at a depth of 12 to 24 inches.

By September 29, Davis had used 128 pounds of nitrogen, 160 pounds of phosphorus, and 52 pounds of potash in fertilizing the 4⅔-acre pond.

Davis spent approximately $9 an acre for fertilizer. Controlling the weeds with herbicides would have cost from $10 to $50 an acre.

The Davis pond contained largemouth bass and bluegills from an earlier stocking. The bass spawned successfully in 1969. Repeated spawning by bluegills, beginning in early June and ending in mid-September, maintained abundant numbers of fry and fingerlings from ¾ inch to 2 inches long.

The increase in phytoplankton increases the zooplankton (animal life), the food of the bluegills. It takes about 5 pounds of zooplankton to produce a pound of bluegills and about 5 pounds of bluegills to produce a pound of bass.

With the increase in fertility and the consequent increase in plankton, fishing became excellent the first summer in the Davis pond. But the total in fish pounds per acre yielded by the pond is yet to be determined.

The fertilization program in the field trial generally followed the recommendations in USDA Farmers' Bulletin 2210, *Warm Water Ponds for Fishing*. The bulletin recommends the use of inorganic fertilizers with a nitrogen-phosphorus-potassium ratio of 8-8-2. Commonly available pasture and orchard fertilizers in California were substituted to approximate that ratio.

In the Sacramento Valley, seasonal temperatures of pond waters and the commonly occurring waterweeds are similar to those in the Southeastern States. Problems and opportunities for good management appear to be similar to those studied by Dr. H. S. Swingle and his colleagues in Alabama. Davis' experience indicates that some western waters may be more fertile than ponds in the Southeast. Southeastern ponds require an average of 60 to 80 pounds of nitrogen and phosphorus an acre of surface, compared with the 25 pounds required by Davis' pond. This lesser requirement has been partially verified by experience with other ponds in the study.

Mel Davis checks his pond's water clarity, a clue to fertility levels.

The key to evaluating fish pond stocking and fertilization practices will be the management and harvest records of fish pond owners. Such records should include surface area, degree of erosion, waterweed problems, fish stocking, water temperatures, responses of various types, amounts of fertilizer, spawning dates, and the pounds of fish removed.

From this information researchers can determine costs and yields at two levels of management—the unfertilized pond with its growth of weeds and the adequately fertilized pond, weedless and providing greater fishing success. ♦

City folk beat trail to these farm cabins

By John R. Swanson
District conservationist, SCS, Harrisville, Mich.

No rat race of neon lights, no waiting lines or horns. A vacationer's dream? Maybe, but at the Robert Reames farm it is a reality for those who rent his vacation cabins.

Add the personal touch of Bob and Jenny, and the dream is complete. And you can't beat the Reames' baked goods and fresh vegetables!

The 280-acre Reames farm is in Alcona County in northeastern Michigan. Within a few hours by car are cities such as Flint, Saginaw, Detroit, and Toledo.

Reames is a past director of the Alcona Soil Conservation District. It was in his term as a director that he talked over his vacation cabin idea with Dean Gordon, area conservationist for the Soil Conservation Service.

In August 1966 the Reames built a dam that made an attractive pond on unproductive pasture. SCS engineers designed the dam and supervised the work. The design for an A-frame cabin also came from SCS. Trees bought and cut from nearby Huron National Forest property were sawed into lumber at a local sawmill. Reames completed the first of three proposed cabins in July of 1967.

An ad in a Detroit paper brought the first guests. It was the beginning of many new experiences and friendships for the Reames.

That first November a heavy snow clung to the cabin and the conifer trees around it. The scene became the color photograph on the Reames' Christmas cards. When the cards were mailed, more reservations came for the next summer. Many people called to reserve the cabin for weekends of snowmobiling and skiing. Before leaving, some of the first guests reserved the cabin for vacation the next summer.

Reames started work on wildlife habitat along with the first cabin. In an area used for 30 to 40 years as pasture for cattle and sheep, wildlife food plots and fruit-bearing shrubs have been planted on the contour in the open areas. Carl Stamm, SCS district conservationist, helped Reames select the shrubs best adapted to his soils. Reames planted Christmas trees between the food plots.

Two miles of nature trails wind through the 65 acres of woods and open areas that once were pasture. One trail parallels a trout stream. Stone placed in the stream has created a small waterfall.

Some of the guests spend their entire vacation at the farm. They fish, swim, or hike the trails and enjoy the outdoors. Books for identifying trees, birds, and animals are on a table. Conservation practices on all of Reames' fields provide beauty and pleasant surroundings.

Haying and other farm chores are always attractions on the farm. One evening a week is tour night. Guests join in cars for a ride through the

The A-frame is the second of three vacation cabins Robert Reames plans to construct on his farm.

XUM

Huron National Forest. Wildlife is abundant. It is common to see a doe and fawns cross in front.

There are no signs on highways to guide customers to the Reames farm. Each guest is equipped with maps and complete directions on how to get there. The advertising is in city papers. Customers have told friends, who write for reservations.

In 1969, his second full summer of operation, Reames put only two ads in the paper. He received 20 calls after one ad. He had reservations for his second cabin before the footing was laid.

Reames' idea is to develop slowly and learn. He says recreation is a new business on farms. Those who have tried it have found that it is more than just providing facilities.

"You have to learn what the people like," he points out. "You can sell recreation at almost any price if you have what people want." ◆

Study shows what plants deer prefer

The New Mexico Department of Game and Fish has been interested for years in seeding browse plants on game ranges. To help, the department entered into cooperative agreements with two institutions also interested in game range improvement. The first was New Mexico State University, which with the Soil Conservation Service operates the Los Lunas Plant Materials Center. The second agreement was with the Rocky Mountain Forest and Range Experiment Station.

In summer 1965, 10 species of potted plants from the Los Lunas Center were placed in a rabbit's cage. Notes were taken daily to determine which plants the rabbit preferred. This led to the idea that a deer preference study could be conducted in somewhat the same way.

In 1966 a herd of seven deer and six fawns was located in a fenced area at Los Alamos Scientific Laboratory. The herd had lived for several years in the 80-acre pasture at about 7,500 feet elevation in ponderosa pine timber.

Ninety-nine browse plants of 16 species were transplanted into the pasture August 12, 1966. On the morning of August 13 the plots were inspected. The deer had found them. Eight of the plants had been sampled.

After 14 days the degree of plant removed by the deer was as follows: Skunkbush 62 percent, black locust 40 percent, silver buffaloberry 36 percent, honey suckle 26 percent, mountain mahogany 22 percent, Siberian elm 9 percent, desert peach 7 percent, Siberian pea 6 percent, fourwing saltbush 6 percent, and bitterbrush 3 percent. There was no use of cliff-rose, Russian olive, New Mexico olive, Apache plume, dune broom, and winterfat.

A followup study in 1967 with similar plants corroborated the first year's findings.—SAMUEL H. LAMB AND DANIEL L. MERKEL, *federal aid coordinator, New Mexico Department of Game and Fish, and plant materials specialist, SCS, Santa Fe, N. Mex.* ◆

Conservation and birds help control insects

With the right habitat, plenty of nesting cover, water, and food, numbers and varieties of insect-devouring songbirds can be multiplied, reports Hugh Steavenson, president, Forrest Keeling Nursery, Elsberry, Mo.

He says the nursery maintains hedge-rows or shrubs every 100 feet or so for windbreaks and for seed production. It also has many border, edge, and fringe plantings that permit a near-maximum of songbirds and other wild creatures. As a result, Steavenson says, Keeling Nursery's insect problem in growing a wide variety of trees, shrubs, and evergreens is minimal, and spraying only occasionally is necessary for some specific pest. ◆

Meetings . . .

An anniversary and "Turning Points in Time"

The Soil Conservation Society of America celebrates its 25th year of advancing the science and art of good land use at its meeting in Toronto, Ontario, Canada, August 9-12.

Its theme, "Turning Points in Time," represents the spirit of today's SCSA. Speakers will cover more than 10 major topics—among them "Waste Utilization and Our Land Resources," "Current Research in Land Resource Use," "People in a Northern Environment," "Water Management and Multiple Use," and "Conservation and the City." Award presentations, technical tours, and a Silver Anniversary Banquet complete the program.

Keynote speaker will be Joseph L. Fisher, president of Resources for the Future, Inc. Other major natural resource conservationists to speak include N. C. Brady, director of research, Agricultural Experiment Station, Cornell University, Ithaca, N.Y.; Leon W. Weinberger, vice president, Zurn Environmental Engineers, Washington, D.C.; J. R. Wier, chairman, Fisheries Research Board, Ottawa, Ontario; and J. P. Bruce, director, Canadian Center for Inland Waters, Burlington, Ontario.

Agronomy Society's changing world

The American Society of Agronomy, Soil Science Society of America, and Crop Science Society of America plan a joint annual meeting at the University of Arizona in Tucson, Ariz., August 23-28.

The American Society of Agronomy is planning special symposiums on "Agronomy in a Changing World" and associated subjects. Papers in the other two societies will cover a wide range of scientific subjects.

In all, about 1,400 are expected to contribute more than 800 papers for about 120 sessions.

The Soil Science Society will sponsor a special field tour to review results of several studies of soil geomorphology in the state. Other tours, as well as special programs for the ladies, are in view.

Geographers to discuss many environmental topics

Varied subjects to be discussed at the Association of American Geographers' 66th Annual meeting in San Francisco, Calif., August 23-26, include: Urban geography, geomorphology, western landscapes, climatology, Appalachia, rural geography, community of survival, pollution, and remote sensing.

Education emphasizes quality living

"Conservation Education for Quality Living" will be the theme of the Conservation Education Association's national meeting August 16-20. The group will meet in Lafayette, La., on the campus of the University of Southwestern Louisiana.

Dates and places

August 2-4, Community Development Society, University of Georgia, Athens, Ga.
9-12, Soil Conservation Society of America, Toronto, Canada
16-20, Conservation Education Association, Lafayette, La.
23-26, Association of American Geographers, San Francisco, Calif.
23-28, American Society of Agronomy and Soil Science Society of America, Tucson, Ariz.
23-28, American Institute of Biological Sciences, Summer Meeting, Bloomington, Ind.
28-29, The Nature Conservancy, Madison, Wis.
September
13-16, Farm and Industrial Equipment Institute, Toronto, Canada
13-17, American Fisheries Society, New York, N.Y.
14-18, International Association of Game, Fish and Conservation Commissioners, New York, N.Y.
27-30, National Recreation & Park Association, Philadelphia, Pa. ♦

Review

Functioning of Terrestrial Ecosystems at the Primary Production Level. EDITED BY F. E. ECKARDT. *1968. UNESCO, Paris (distributed by Unipub, Inc., New York). 516 pp., illus. $19.*

In this scholarly volume, UNESCO delivers the results of another of its symposiums on ecology that have grown out of its Arid Zone Research Programme launched in the early 1950's.

"It became clear," Editor Eckardt notes in the foreword, "that the ecologists were much better armed to study the plant as a single item than overall vegetation; much less, therefore, the ecosystem."

Accordingly, an international symposium devoted essentially to the title subject was held in Copenhagen in 1965.

The papers of that symposium are reproduced here, the full text in either English or French with a summary in the alternate language.

Titles range from such broad subjects as "Energy Exchange in the Biosphere" and "World Distribution of Plant Biomass" to the finest technical details of laboratory and field methodology.

Both price and the technical level of the papers will keep the book from finding a place in many individual working libraries, but it is a valuable addition to the background reference material on a subject of increasing concern to conservationists.—B.O.O.

New publications

Working Together. BY THE NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS AND THE SOIL CONSERVATION SERVICE. *National Association of Conservation Districts, League City, Tex. 1970. 14 p. folder.* Presents a program of action by both organizations. Conservation districts are being challenged to provide assistance in community planning, making orderly changes in land use, multiple-use of resources, water-supply development and protection, soil and water management in urbanizing areas, watershed and river basin planning, reclamation of mined and other disturbed areas, pollution abatement, wildlife and recreational improvement, conservation education, and environmental enhancement. SCS, in addition to providing help to individual farmers and ranchers through its various programs in districts, has new responsibilities and authorities that embrace more kinds of land and greater numbers of land users. More recent assignments include rural development, technical assistance in urbanizing areas, soil and water pollution abatement, natural beauty, and outdoor recreation. Districts and SCS are working together in these newer areas of responsibility and opportunity as they have in the traditional field of conservation planning and application on farms and ranches.

The Biology of Poor Seed Production in Tephrosia Vogelii. BY FRANKLIN W. MARTIN AND EUGENIO CABANILLAS. *1970. USDA Tech. Bull. 1419. 34 pp., illus. Tephrosia vogelii* Hook. f. a potential source of the insecticide rotenone, plant flowers well, but sets pods and seeds poorly in Puerto Rico. Various factors cause poor fertility, principally pollen abortion and failure of anthers to dehisce. Abortion is associated with weather conditions and may result if moderate temperatures and high humidities do not occur during the week preceding anthesis.

Building, Planting, and Maintaining Coastal Sand Dunes. *USDA Soil Conservation Service Conserv. Inf. 32. 8 pp., illus.* Recommends rebuilding or repairing dunes quickly if vegetative damage occurs; using sand fences to rebuild barrier dunes; spreading salt hay or other mulch material for temporary protection; planting American beachgrass; and fertilizing.

Gardening on the Contour. BY THE SOIL CONSERVATION SERVICE. *1970. USDA Home and Garden Bull. 179. 6 pp., illus. $0.10.* Folder gives guidelines for protecting soil and plants and improving water use in home gardens. Tells how to build terraces and make plant rows fit natural contours.

Soil surveys

Hitchcock County, Nebraska. BY RONALD R. HOPPES, NORMAN W. HUBER, HOWARD E. SAUTTER, AND MAX A. SHERWOOD. *1970. 50 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

Wood and Wirt Counties, West Virginia. BY W. J. ELLYSON, R. F. FONNER, AND W. M. KINKLE. *1970. 79 pp., illus.; maps 4 inches to the mile (1:15,840).*

XUM

Recon . . .

Bills calling for a master plan for Virginia's soil survey and the manpower to complete it by 1990 were passed this spring by the state legislature. The General Assembly asked the Virginia Soil and Water Conservation Commission to have a plan ready for action by the 1972 session. A second bill created a scholarship fund for potential soil scientists. Virginia Polytechnic Institute was authorized to establish 20 annual soil science scholarships. Graduates who take jobs in soil science will not be required to reimburse the state.

Evoking wide attention to our threatened biosphere is the aim of *Catalyst for Environmental Quality* —a spokesman for "the new conservation." The first issue included an article by Dr. LaMont C. Cole, prominent ecologist; a description of *Sediment* (SCS publication); and an advertisement for a Soil Conservation Society of America scholarship. The quarterly will focus on American aspects of international problems of pollution, population, and planning. Editor is Vivian Fletcher; offices are at 333 E. 46th St., New York, N.Y., 10017.

Connecticut's first sanitary landfill district has been created by consolidation of solid waste-disposal operations in four towns. Winchester, Barkhamsted, Colebrook, and New Hartford (all within the Litchfield Hills Planning Region in northwestern Connecticut) will share a 60-acre site chosen with the aid of unpublished soil survey field sheets and composite maps. The landfill district is authorized to charge fees, regulate carriers, and prepare its own budget. Onsite availability of sufficient inexpensive cover material was a primary consideration during final review of 23 potential locations. Had each town developed its own site, two would have been saddled with $10 per capita operating costs. Favorable cost-sharing arrangements between the state and the district bring the cost down to $2 per capita in the four towns.

Conservation practices can substantially reduce water pollution by dieldrin and other organo-chlorine insecticides. After analyzing data from the Northeast Appalachian Watershed (Coshocton, Ohio), Agricultural Research Service scientists in Beltsville, Md., concluded that conservation practices could prevent pesticide transport either in runoff or on eroded soil particles. Results showed that dieldrin leaving fields in runoff was less than 0.03 percent of the amount applied even when conditions favoring surface water movement were created.

Abandoned railroads can become roads to adventure, leisure, and nature. After tracks are taken up, the long, wide, well-drained roadbeds required by trains make ideal trails for riders, cyclists, and hikers. So says a multiscreen slide presentation put together by the Department of Park Administration of Texas Tech University. Replanting may be necessary in spots, but native vegetation usually abounds along railroad rights-of-way. Frequently, grade is gentle enough for people of all ages and degrees of agility. Historic sites and picnic areas might be included in plans for development. The slide talk makes a case for public acquisition and development of this unusual reworkable resource.

Some wild—but not unruly— neighbors will be invited to move into an Illinois subdivision. Plans prepared for a Will County developer include natural areas on each lot line. Strips of grass and shrubs 20 to 40 feet wide will be left between homes to provide potential wildlife cover.

In Manitoba, Canada, inspectors enforcing the Clean Environment Act need no warrant to enter any building, other than a dwelling, to investigate possible sources of contamination. They provide front-line muscle for the province's "watchdog over pollution," the Clean Environment Commission. The commission assesses probable impact of soil, water and air pollution, sets limits and standards for treatment and disposal of wastes, and grants licenses for discharge of wastes into the environment.

Windbreaks of corn helped soybean plants grow taller, produce more dry matter and larger leaves, and retain more water in recent Agricultural Research Service tests at Morris, Minn. The 2-row "cornbreaks," planted across the prevailing southwesterly winds, boosted soybean yields as much as 6 bushels an acre.

Quality fishing?

In promoting quality fishing there is the inevitable question: *What is quality?* We believe quality has three basic dimensions: the aquatic environment (the fishery), the shoreline environment (water-influence zone), and the spatial distribution (angler density) . . . The dimension of space directly influences the quality of the experience regardless of other factors. So the final chapter in the maintenance of quality fishing will be the disposition of angling pressure—people management.—LLOYD M. ANDREWS AND THOMAS J. BOARIO, *biologists, Wisconsin Department of Natural Resources.*

Data on roadside erosion in Wisconsin (*Soil Conservation,* Sept. 1969) have been summarized by the Extension Department of the University of Wisconsin in a publication, *Erosion on Wisconsin Roadsides.* It is available from the Wisconsin Chapter, Soil Conservation Society of America, P. O. Box 5155, Madison, Wis. 53705.

From the Administrator:

From teach-in to teaching

This year seems likely to go down in history as the one in which "ecology" moved out into the popular vocabulary, literally shoved into the limelight through the momentum sparked by the April 22 "Earth Day" teach-in's and the growing environmental concern among students.

What was not said often enough or clearly enough during the verbal deluge which preceded Earth Day is that conservation is ecology in action; conservation practices have always been, for the most part, based on applied ecology.

It is still too early to make any assessment of lasting results from the nationwide educational thrust of April 22, but one trend already surfacing indicates that a growing number of colleges and universities are gearing up for at least one course designed to give students a look at man's relationship to his environment.

But to expect a one-semester college survey of environmental problems to compensate for years of lost opportunities with students in secondary and elementary schools in developing an understanding of conservation principles is totally unrealistic.

The need for conservation education as a part of the school curriculum, kindergarten through high school, becomes more imperative each year, particularly in view of the growing complexity of environmental and conservation decisions facing these students as adult citizens.

The Soil Conservation Service, together with other resource agencies and organizations, stands ready to offer technical services and ecologically sound information which can help teachers and school administrators inaugurate and develop conservation studies within established curricula.

What we, as professional conservationists, have to offer is not a curriculum package with all the corners neatly tucked in. We do not need even to know all the answers to all the questions—there are still discoveries ahead for the child to ponder. What we sometimes forget is that many of the details of resource relationships which we have come to take for granted through years of familiarity are fresh new wonders for the student. The sensitivity and enthusiasm with which we meet his questions will enter into his attitudes and his personal response to the broad ecological base upon which resource use and management rests and will be absorbed into the texture of his understanding of his own place as a steward of environmental quality for himself and for others.

Local schools traditionally have reflected the social, cultural, and economic philosophy of the community, and this is not likely to change soon—nor should it. Most local school boards are made up of conscientious citizens who do their utmost to bring the best educational opportunities to the children of the community.

In this context, soil and water conservation district leaders, equally aware of the needs of their own communities, have probably the greatest opportunity of any single group to work toward a conservation education program within every state.

If the ecological and environmental questions raised by the Earth Day teach-in's do nothing more than stimulate a public awareness of the importance of conservation understanding and concepts as a fundamental part of education, much will have been accomplished.

A recent article in **The American Biology Teacher** magazine quoted Dr. William Stapp of the University of Michigan, a leader in environmental education: "Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution . . . Natural resources serve man in many ways, whether in a relatively undisturbed condition or in the highly altered utilitarian forms."

This pretty well sums up what both teach-in's and teaching are all about.

Kenneth E. Grant

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Planting to keep a bay beautiful

Ordinarily little Kawela Bay on the north shore of Oahu, Hawaii, is noted for its calm, azure water, but heavy storms turn the picturesque bay into a churning mudpot. High seas and runoff stir up and add to a foot of sediment that carpets the bay floor.

Before this century, slight geological erosion was the bay's only significant source of sediment in a drainage area that includes the Koolau mountain range. Trouble started in 1920 when the pineapple industry placed a large acreage under cultivation. Erosion increased because early pineapple growers thought they should plant up and down slopes for proper drainage.

In the early 1930's, cattle were pastured on part of the pineapple acreage. Their trails etched eroding scars on the slopes.

Since the 1940's, the area has been used for troop and mechanized jungle cavalry training. Men digging foxholes, building roads, and operating tanks have added to the load of silt bound for the bottom of the bay.

One hundred acres of sugarcane planted in 1963 replaced the last pineapple field. But newly planted canefields also were subject to damage during storms.

Thick-growing pangolagrass protects a gully's face above Hawaii's Kawela Bay.

Efforts to control erosion were begun in 1965 by trustees of the Campbell Estate, which owns the watershed. A request for Soil Conservation Service help came through the Windward Oahu Soil and Water Conservation District.

Two thousand pines were planted in the fall of 1965 for future harvest. Another 5,000 were planted a year later. Trial plantings of grasses also were made during the 1966 experiment with material furnished by the SCS Hawaii Plant Materials Center.

Studies showed pangolagrass provided the most rapid and complete cover on severely eroded sites. Therefore, more than 100 acres have been planted in pangola since original trading. Fertilizer is applied to increase grass growth and vigor.

In addition to these vegetative measure, studying the possibility of a sediment-retention dam is being considered.

SCS specialists say that the successful Koolau Range plantings could prove helpful in solving similar problems and in roadside beautification and erosion control during housing development.—MAX S. CORAY, *district conservationist, SCS, Honolulu, Hawaii.* ♦

XUM